

ADVANCES IN MATERIALS ENGINEERING

Volume 1

Edited By:
Zahurin Halim
Iskandar Idris Yaacob
Md Abdul Maleque



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978-967-418-167-3

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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Effect of Fibre Length on Tensile Properties of TPNR-Kenaf Fibre Composite

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Keywords: thermoplastic natural rubber, kenaf fibre, fibre length, tensile properties, natural fibre.

Abstract. Biocomposite based on thermoplastic natural rubber (TPNR) and kenaf fibre (KF) was developed with the aim to enhance performance of polymeric material, to reduce usage of petroleum-based as well as to produce light weight product. In this preliminary report, the effect of kenaf fibre length on tensile properties of TPNR was investigated. Total kenaf fibre incorporated into TPNR was 10 vol%. Biocomposite of TPNR-KF was processed using an internal mixer and then compression moulded for the tensile test. From tensile test, it was found that the average kenaf fibre length of 300-500 μm resulted in the highest tensile strength and modulus.

Introduction

The increasing demand for environmental friendly materials and the desire to reduce the cost of traditional fibres have led to the development of reinforced petroleum-based composites as well as new bio-based composites. Attention has been focused on natural fibre composites or biocomposites. Natural fibre composites are composed of natural or synthetic resins, and reinforced with natural fibres. Natural fibres like flax, hemp, kenaf, etc possess mechanical properties comparable to those of synthetic fibres. They are even lighter, less expensive, biodegradable and are available as agricultural resources in many countries in the developing world. Composites fabricated using these natural fibres have the potential to be attractive alternative to man-made fibre composites, and are currently being explored in sectors like automotive and buildings.

Natural lignocellulosic fibres can be classified as bast, leaf or seed hair fibres depending on their origin. In the plant, the bast and leaf fibres give mechanical support to the plant stem's and leaf. Seed-hair fibres on the other hand are attached to the plant's seed and aid in wind dispersal. Table 1 described the fibres geometries, common applications and examples of plants in its class (Rowell et al. 1997).

Kenaf or *Hibiscus cannabinus L*, is a tropical crop native to Africa. Kenaf is an annual plant with a single, straight, unbranched stem consisting of an outer fibrous bark and an inner woody core. The kenaf stem can grow 5-6 m in height and 25-35 mm in diameter with 5-6 month harvesting period (Tao et al. 1995). Raw kenaf fibre which obtained from the outer bark consists of a bundle of fibres.